Cooke Hydroelectric Plant, Powerhouse
Cooke Dam Road at the Au Sable River
Oscoda Vicinity
Iosco County
Michigan

HAER No. MI-98-C

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Mid-Atlantic Regional Office
Department of the Interior
143 South Third Street
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD

COOKE HYDROELECTRIC PLANT, Powerhouse

HAER No. MI-98-C

Location: Cooke Dam Road at the Au Sable River
Oscoda Vicinity
Iosco County, Michigan

UTM: 17:295450:4927350
Quad: Sid Town, Mich., 1:24,000

Dates of Construction: 1910-1911

Engineers: William G. Fargo, Fargo Engineering Company, Jackson, Michigan, (civil and hydraulic engineer); and
James B. Foote, Consumers Power Company, Jackson, Michigan (electrical engineer)

Present Owner: Consumers Power Company,
212 West Michigan Avenue, Jackson, Michigan 49201

Present Use: Powerhouse for hydroelectric generating plant

Significance: The Cooke Hydroelectric Plant Powerhouse was designed by William G. Fargo, a Jackson, Michigan, civil engineer who specialized in small and mid-sized hydroelectric plants in the Midwest. The Powerhouse shelters all the electrical generating equipment for the Cooke system, which was designed by electrical engineer James B. Foote. When it went on line in 1912, the plant set a new record for transmission voltage and marked the beginning of a comprehensive system of power supply for the State of Michigan.

Project Information: This documentation was prepared by Consumers Power Company (CPCo) in conformance with its Cultural Resources Management Plan for the Au Sable River Hydroelectric Projects (July 1995). The plan stipulated the recordation of the entire Cooke Hydroelectric Plant (according to the standards of the Historic American Engineering Record) as mitigation for the planned rehabilitation of the plant's concrete spillway. The documentation was completed in 1996 by Hess, Roise and Company of Minneapolis under contract with CPCo. Jeffrey A. Hess served as Principal Investigator and Cynthia de Miranda as Project Historian. Project photography was completed under a subcontract with Hess Roise by Clayton B. Fraser of Loveland, Colorado.

PHYSICAL DESCRIPTION

Nestled between the Spillway (HAER No. MI-98-B) to the north and the South Embankment (HAER No. MI-98-E) to the south, the Powerhouse occupies what was once the middle of the Au Sable River's natural channel, before construction on the Cooke Hydroelectric Plant began in 1909.[1] Measuring 67'-0" east-west by 116'-0" north-south, the steel-framed, red-brick building rests on a reinforced concrete foundation that rises above the tailwaters on the downstream (east) side, forming a broad plinth ornamented with four incised horizontal bands. Although the Powerhouse does not express a fully elaborated architectural style, it evokes the Historic Revival mode, popular at the time of its construction, through the use of generic historicist details. From bottom to top, these design elements include bold, flat-arched, brick window hoods with corbelled stops and simulated key stones; a corbelled stringcourse; corbelled cornices (horizontal and raking) with abbreviated corbelled gable-end returns; green, glazed, clay-tile roofing; and shallow gable-end parapets with stepped ends.

Five window bays divide the main (east) facade of the Powerhouse. Industrial steel sash fills the rectangular window openings, and personnel and cargo doors occupy the lower third of the second window from the southern end of the building. The south facade of the Powerhouse displays one window centered in the upper portion of the wall; a vent has replaced its industrial sash. Below the window is an opening, now infilled with plywood, which originally accommodated cable insulators that enabled transmission wires to pass through the wall to the line outside.[2] To the right (east) sits another small window that holds a replacement vent instead of the original industrial sash. The north facade displays the same fenestration, but a personnel door replaces the insulator opening. From the Powerhouse, the door opens to a concrete staircase leading west to the Spillway piers (HAER No. MI-98-B) and the deck of the hollow, concrete, penstock block adjacent to the rear (west) wall of the Powerhouse. The block houses the massive, molded-concrete tubes through which the water flows after passing through the plant's three turbines, also sheltered inside.

The penstock block is slightly smaller than the Powerhouse, and it obscures most of that building's rear (west) wall. The northern end of the South Embankment's corewall (HAER No. MI-98-E) joins with the southwest corner of the block, keeping the impounded water from the Powerhouse. A single window punctuates the south end of the west Powerhouse wall; and a set of five small, horizontal windows positioned near the roofline run the remaining length of the facade.

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[1] While the Powerhouse is more accurately aligned on a northwest-southeast axis, this description is written to reflect approximate full cardinal points for the sake of clarity.

[2] "Cooke Development, 1913," Cooke Hydroelectric Plant construction and overview photographs at Consumers Power Company Hydro Operations, Cadillac, Michigan.

Two sets of wooden hatches on the deck of the penstock block allow access to the turbines and to the penstocks' controlling headgates. Motorized chain hoists, mounted just west of the headgate hatches, raise and lower the penstocks' Tainter gates. The use of Tainter gates for penstock control represented a first in American hydraulic design.[3]

The three turbines are characterized as quadriplex units, for the fact that four waterwheels are situated on each turbine shaft running to a generator. The 4,150-h.p., Allis-Chalmers turbines are horizontally direct-connected to General Electric 2,500-volt, 60-cycle, three-phase alternating current generators situated in the Powerhouse. The generators, in turn, are direct-connected to 32 kw exciters. Each generating unit is controlled by a belt-connected, Allis-Chalmers oil-pressure governor.[4] The generating equipment is essentially original, although some components have been replaced due to wear.

The Powerhouse interior is largely open, with a full-sized basement and a small, empty mezzanine in the southeast corner of the building. A shop occupies the space below the mezzanine. Connecting shafts emerge from the west wall to link the turbines in the penstock block to the generators in the Powerhouse. Generators and their governors occupy most of the floor space in the center of the Powerhouse. Near the east wall, a flat-roofed, metal booth with large windows houses the office and a new switchboard. Overhead, spanning the width of the interior, is a movable Shaw 20-ton crane, which rolls on steel tracks supported by the brick-enclosed steel frame of the Powerhouse.[5]

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[3] "Highest-Voltage Transmission System in the World, Part I," *Electrical World* 59 (13 April 1912): 795.

[4] "Design and Methods Employed in Constructing the Cooke Water Power Plant on the Au Sable River in Michigan," *Engineering and Contracting* 37 (5 June 1912): 642; "Highest-Voltage System," 795.

[5] This description is based on a site survey completed by the authors on 27 July 1995.

HISTORY

Construction on the Powerhouse began in 1910, after the Au Sable River had been diverted to the north end of the channel to allow for excavation. Nearly all the building materials were brought over a sixteen-mile, narrow-gauge railroad, and additional railroad trestles were laid to move building supplies around the site more easily. Workers also erected a 10,000-barrel cement mixing plant on the south river bank near the rail extension and a 500 h.p. steam plant just downstream of the construction site. The steam plant supplied power for construction machinery, including the concrete mixer.

Fargo made preliminary sketches of the Powerhouse in 1909 and finalized the plan by the end of that year, when excavation began.[6] Crews started pouring concrete in 1910, beginning with the reinforced foundation for the Powerhouse and its penstock block. The section was poured on concrete toothing carried into the hard clay below the sandy river bottom. The design called for "molded" concrete passages, built into the penstock block and the Powerhouse foundation, to direct the water past the turbines and under the Powerhouse to its exit at the tailrace.[7]

The close of the year saw completion of the foundation concrete work. Crews installed the generating equipment, including the turbines, shafts, and generators, before erecting the building's superstructure. The Powerhouse's steel framing and brick walls were placed in 1911, concurrent with the construction of the North and South Embankments (HAER Nos. MI-98-A and MI-98-E). Workers also poured the concrete top and sides of the penstock at that time.

By January 1912, the entire complex was finished. After ten days of testing, the *Tawas (Mich.) Herald* reported that on 2 February, "the electric juice [was] turned on" for the first time. "It is carried down copper cables strung on steel towers 45 feet high. . . . The ultimate capacity of the stream . . . is estimated at 92,000 horse power."[8]

The Powerhouse has seen few major alterations in its lifetime. A monitor, which ran nearly the length of the building, was removed in 1925. The insulators and transmission lines in the south wall were taken out sometime before 1940, when the outdoor Substation (HAER No.

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[6] See William Fargo, "Section through Penstocks-Plans for the Dam and Power Plant on the Au Sable River—Cooke Site, 1909," Drawing 1602, Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

[7] "Design and Methods Employed," 639-641.

[8] "Au Sable Electric Juice is Turned On," *Tawas (Mich.) Herald*, 9 February 1912, p.1.

MI-98-D) was established. Several windows on the north, west, and south facades have been replaced with vents. The transformers that once stood in the south end of the building were removed in 1957.[9]

[9] For changes to the facility, see the following engineering drawings in Consumer's Power Company's Corporate Archives: Commonwealth Power Corporation for Consumers Power Company, "New Roof-Cooke Development, 1925," Drawing M28-F1007; "Layout of Bus Run from Switch Structure, 1925," Drawing M28-G28 Sheet 1, updated through 1993; and "General Design-Exhibit F2, 1994," Drawing No. 28, Sheet F2.

SOURCES OF INFORMATION

ENGINEERING DRAWINGS

Commonwealth Power Corporation for Consumers Power Company. "General Design-Exhibit F2, 1994," Drawing No. 28, Sheet F2. Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

———. "Layout of Bus Run from Switch Structure, 1925," Drawing M28-G28 Sheet 1, updated through 1993. Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

———. "New Roof—Cooke Development, 1925." Drawing M28-F1007. Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

Fargo, William. "Section through Penstocks—Plans for the Dam and Power Plant on the Au Sable River—Cooke Site, 1909." Drawing 1602. Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

HISTORIC VIEWS

Cooke Hydroelectric Plant construction and overview photographs. Historical files, Hydro Operations, Consumers Power Company, Cadillac, Michigan.

PUBLISHED SOURCES

"Au Sable Electric Juice is Turned On," *Tawas (Mich.) Herald*, 9 February 1912, p.1.

"The Design and Methods Employed in Constructing the Cooke Water Power Plant on the Au Sable River in Michigan." *Engineering and Contracting* 37 (5 June 1912): 639-644.

"Highest-Voltage Transmission System in the World, Part I." *Electrical World* 59 (13 April 1912): 795-798.